



# CAIT

Center for Advanced Infrastructure & Transportation  
Rutgers, The State University of New Jersey

NJDOT Bureau of Research  
QUARTERLY PROGRESS REPORT

Project Title:	Instrumentation and Monitoring of Bridge Approach Slabs – Phase II		
RFP NUMBER: N/A	NJDOT RESEARCH PROJECT MANAGER: W. Lad Szalaj		
TASK ORDER NUMBER:	PRINCIPAL INVESTIGATOR: Hani Nassif		
Project Starting Date: 1/1/2001 Original Project Ending Date: 12/31/2004 Modified Completion Date: 12/31/2006	Period Covered: 4 <sup>th</sup> Quarter 2006		

Task	% of Total	% of Task this quarter	% of Task to date	% of Total Complete
Literature Search				
1. Instrumentation Plan and Field testing	30%	0%	100%	30%
2. Calibration of Sensors and DAS	20%	0%	100%	20%
3. Data collection and LTRM	20%	5%	100%	20%
4. FEM Verification	10%	0%	100%	10%
5. Progress Reports & Technical Memorandum	15%	5%	100%	15%
6. Monitoring of Victory Approach Slabs	20%	50%	85%	17%
Final Report	5%	10%	90%	4.5%
TOTAL	120%			116.5 (116.5/120 = 98 %)

\*Added Task

### Project Objectives:

To develop and specify new design method for bridge approach slab. The main objective of this study is to evaluate the cracking behavior of approach and transition slabs and the interaction between soil-slab-vehicle systems. The scope of the study is as follows:

1. Develop a detailed 3-D finite element model that would incorporate the nonlinear and cracking behavior of reinforced concrete as well as the inelastic soil properties.
2. Compare results from the 3-D model with distress observed on actual structures
3. Perform a comparative parametric study to optimize the slab design.
4. Instrument and monitor the long-term performance for the newly designed and constructed approach and transition slabs on Doremus Avenue bridge project.
5. Apply the newly designed slabs to new bridge projects and instrument them for more data collection and testing.

### Project Abstract:

Bridge approach slabs provide a transitional roadway between pavement and the actual structure of the bridge. This transition is crucial in reducing the dynamic effects imposed on the bridge by traffic and truckloads. However, under the effect of heavy impact loads, coupled with unknown or inadequate soil conditions (e.g., settlement, embankment bulging, poor fill material, inadequate compaction, poor drainage, etc.), a number of approach slabs in the State of New Jersey have exhibited transverse structural cracking. This type of transverse cracking, as observed by site engineers of the New Jersey Department of Transportation (NJDOT) as well as the Rutgers Team, occurs even on relatively newly constructed slabs. Various design schemes of the approach and transition slabs (e.g. alteration of the thickness of the approach slab, adding number of rebars, increasing concrete strength, etc.) have been implemented, however, the structural cracking have persisted.

Despite the widespread occurrence of bridge approach problems, only a small number of research studies have been performed on the subject. Few studies have been developed for evaluating the cracking behavior of bridge approach slabs. However, this problem is becoming an increasingly important topic in the effort to deal with the



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deteriorating infrastructure and rehabilitation of roadways. Major decisions must be made to allocate the limited funds available for repair, rehabilitation and/or replacement on the basis of a detailed evaluation of the structural integrity of bridge approach slabs. Therefore, there is a need for new design schemes that can ensure crack-free slabs and for the field monitoring their behavior under actual truck traffic.

1. Progress this quarter by task:

- A draft final report that covered the field installation, monitoring, and performance of the new bridge approach details, was submitted to NJDOT and is being reviewed.

2. Proposed activities for next quarter by task:

- Continue monitoring and data collection of the approach slabs at Victory Bridge and Doremus Avenue Bridge.
- Update the final report by including the comment and suggestion of NJDOT as soon as they are received.

3. List of deliverables provided in this quarter by task (product date):

N/A

4. Progress on Implementation and Training Activities:

N/A

5. Problems/Proposed Solutions:

- Access to the Victory Bridge data logger location is still limited. Data has not been download since the end of construction. It is expected that a few month of data will be lost.

Total Project Budget	NA add-on
<b>Modified Contract Amount:</b>	
Total Project Expenditure to date	NA add-on
% of Total Project Budget Expended	NA add-on

\* These are approximate expended amounts for the project; these estimates are for reference only and should not be used for official accounting purposes. For a more accurate project accounting please review the quarterly invoice for this project.